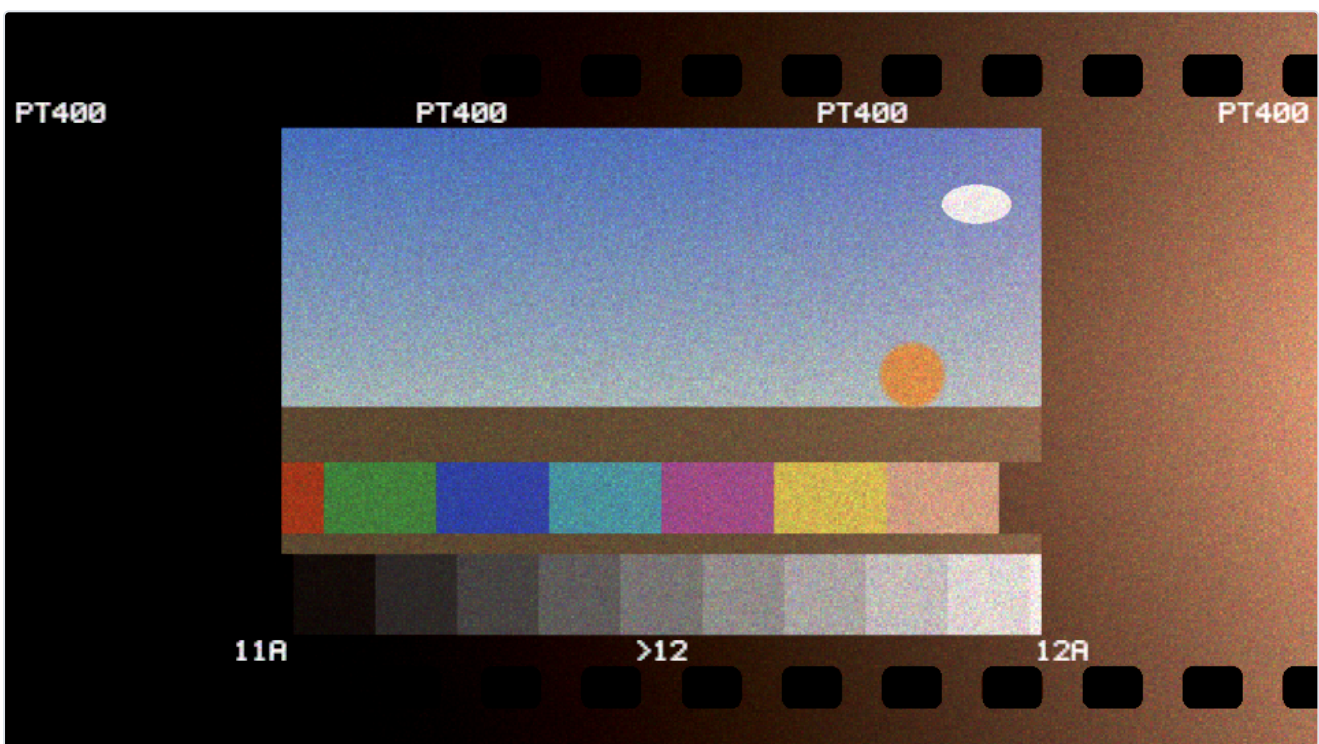


Rebate user guide

Rebate is **colour negative film**, and the scan of it, for **Resolume Arena and Avenue**, as an FFGL effect. It is not a lookup table. The clip is treated as the scene: it exposes the three layers of a colour negative, each layer is developed along a characteristic curve into dye, the dyes' impurities are cancelled by an orange mask, the dye is realised as grain, and then the orange negative is scanned and inverted the way a lab scanner does it. The orange negative, the grain, blue shadows on expired stock, a warm light leak, cross-processing and the black rebate round the frame are each one of those stages doing what it does. None of them is drawn.



The harness's test card through the plugin, rendered by the offline harness rather than captured from Resolume. Portrait 400 on a 35 mm strip, with a leak from the right.

Before you rely on this: first released at **v0.1.0**, and honestly early. The film is measured rather than asserted, by a harness that drives the real plugin class, at two resolutions: a grey wedge's density climbs with slope 0.57948 for a stated γ of 0.58, inside a band derived from the curve's own bends, and the toe and shoulder land $1.2e-3$ log units from where the curve says; a neutral wedge through C-41 with its orange mask, scanned manually, comes out neutral to $1.1e-6$; grain variance at half coverage is $1.9158e-2$ against a predicted $1.9159e-2$ over 921,600 samples, and peaks there in every channel; one stop of push reads back $\gamma \times 1.15000$ and fog $+0.030000$; a leak adds density along the curve and stops at its shoulder; every unclipped step of a cross-processed wedge scans $R > G > B$; the sprocket holes and the rebate are exactly black in the positive. Eleven deliberately broken versions of the model were each caught by those checks. All 22 controls measurably change the picture. It **has not been loaded into Resolume on macOS yet**. The one host it has run in there is the fleet's own test host, `oxbow`, for 120 frames. On Windows, a build of v0.1.0 loads, registers and renders in Resolume Arena 7.27.1, with every control matching what the plugin declares — on software rendering, so that says nothing about a GPU. The only pictures anyone has judged it on are a synthetic test card and Resolume's own demo clips put through the harness. Try it on a spare layer before you put it in a show.

This codebase was created with AI assistance, directed and reviewed by a human author.

Installing

Every download carries one effect, **SW Rebate**. Drop it into Resolume's effects folder and restart Resolume:

```
macOS    ~/Documents/Resolume Arena/Extra Effects/
Windows  %USERPROFILE%\Documents\Resolume Arena\Extra Effects\
```

Avenue uses the same layout under its own folder name. The effect then appears in the effects browser as **SW Rebate**.

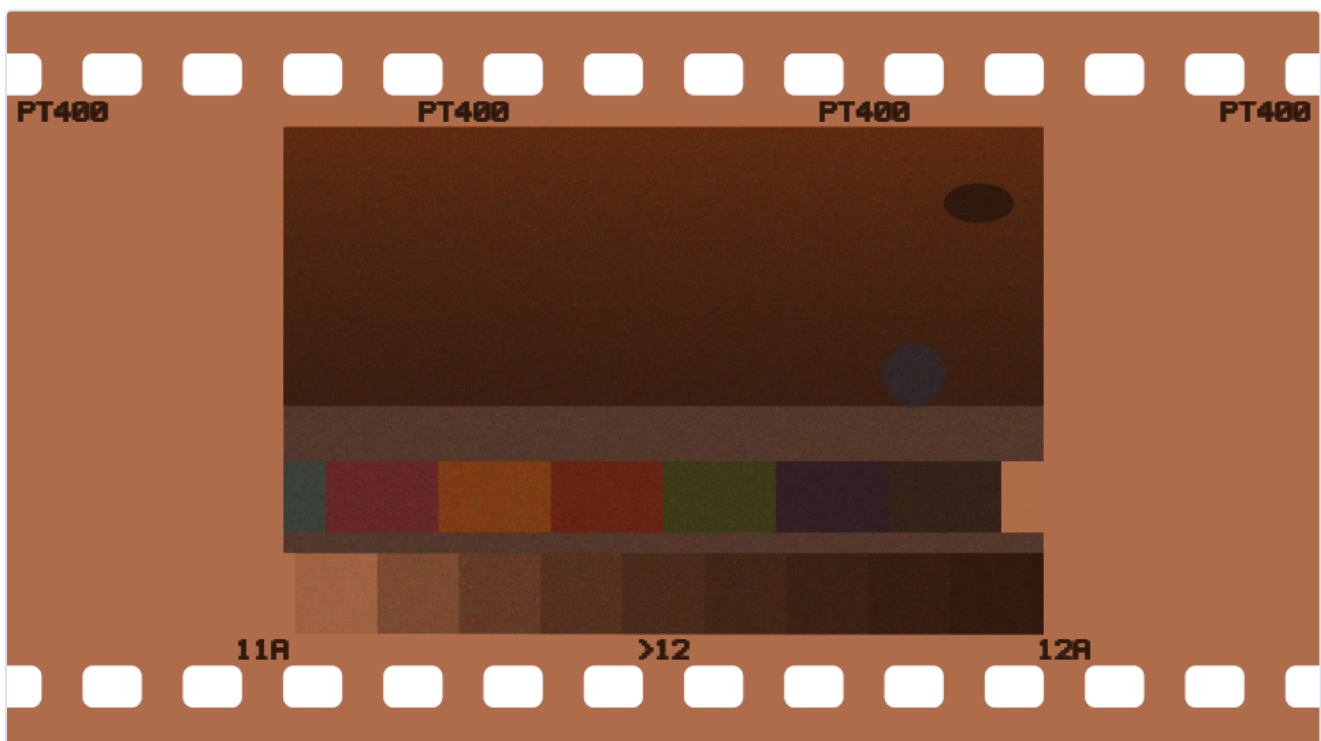
The macOS download is a universal build (Apple silicon and Intel), as a `.dmg` or a `.zip`. It is **Developer ID-signed and notarised**, so the bundle simply loads. The Windows download is an x64 installer or a `.zip`. It is not code-signed, so the installer trips SmartScreen once: **More info** → **Run anyway**.

A film look that is the process

A film look is usually a lookup table: a fixed mapping from each input colour to an output colour, fitted to what some stock looked like once. Rebate runs the process instead, in order:

1. **Exposure.** The clip, decoded to linear light, is the scene. It exposes three layers — red-, green- and blue-sensitive — through a small overlap between their sensitivities, as real layers do. A neutral scene exposes all three equally.
2. **Development.** Each layer climbs a **characteristic curve**: a toe where the shadows start to register, a straight line of slope γ (the stock's contrast), and a shoulder where the highlights stop adding density. The film holds about nine stops between toe and shoulder.
3. **Dye and the mask.** The red layer forms cyan dye, the green magenta, the blue yellow. Real dyes absorb some light they should not, so a colour negative carries **masking couplers**: coloured wherever dye did *not* form, and carrying exactly the unwanted absorption that dye would have had. The total is the same everywhere: a constant **orange**. That is why a negative is orange, and why the scanner can divide it out and leave the colours clean.
4. **Grain.** The dye forms as clouds in grain cells. Each cell has a fixed number of sites a cloud can land on, and the fraction covered varies from cell to cell like any count.
5. **The scan.** The flat, orange, inverted negative is scanned: the base divided out, black and white points set, inverted, and a scanner gamma applied.

Everything an operator would call "film" comes out of one of those steps. Because each control acts on its own stage, they interact the way film does: over-exposure rolls off because the curve has a shoulder, a leak cannot burn past white because it is an exposure going through that same curve, and grain is loudest in the mid-tones because a count varies most when half the sites are covered.



View: Negative : what is on the film before the scanner inverts it.

Start here

Put SW Rebate on a layer with something in it and leave every control alone. The defaults are **Portrait 400, normally exposed and developed in C-41, grain at about a third of its physical strength, scanned manually with the lab's C-41 profile, on a 35 mm strip**. The picture sits in a 3:2 frame in the middle of the output with a black border round it and light edge print above and below.

Then, in this order:

1. **View → Negative**. The film itself, on a light box: an orange strip, the picture inverted, clear sprocket holes along both edges. Put it back to **Positive**.
2. **Exposure**. Take it down three stops and the shadows sink into the toe. Take it up three and the highlights roll off on the shoulder instead of clipping hard.
3. **Leak Amount**. Raise it and a warm light leak burns in from the right edge, across the picture and the border alike. In the border it shows up the sprocket holes, which are black on black until something lights the film round them.
4. **Stock → Expired 400**, or raise **Age**. The shadows go blue and the highlights warm.
5. **Process → Cross**. Slide film through negative chemistry: steep, warm, most of all in the shadows.

Manual scan is the default on purpose. A real lab scanner re-measures every roll and takes most of an exposure error, an age cast or a missing mask straight back out again: those are, to a first order, per-channel offsets and scales, which is exactly what per-channel levels remove. With a manual scan every control does what it says. For badly exposed footage that you simply want to look like film, turn on **Auto Levels**: that is the lab doing its job.

Format → Full drops the strip and puts the scanned picture in the whole frame. Everything but Edge Text On and Frame Number still works there.

Time comes from the host

Two things read the host's clock: the grain, which re-draws at 24 film frames a second of host time, and Auto Levels' smoothing. Everything else is a function of the picture and the controls alone. Because the grain is a pure function of the film frame, the seed and the pixel, a re-render of the same composition frame grains the same frame the same way, and grain stands still when the host's clock stops.

For the first few frames after it loads, the effect runs on its own steady clock while it works out whether the host counts time in seconds or milliseconds. Then it switches to the host's.

The Scene group

Exposure — the camera's exposure, from -6 to +6 stops, linear: 0 in the middle (the default), one stop for every twelfth of the travel. It multiplies the scene's light before the film sees it, so it goes through the curve. Under-exposed, the shadows fall into the toe and flatten; over-exposed, the highlights compress on the shoulder. The film holds about nine stops between the two, with mid grey a little over four stops above the toe. With Auto Levels on, the scanner takes most of an exposure change back out.

Stock — five invented films, described by their parameters rather than copied from any real product:

Stock	Edge print	Kind	γ	Grain sites a cell	Fog	Age
Fine 100	FN100	negative	0.62	64	0.10	0
Portrait 400 (default)	PT400	negative	0.58	32	0.14	0
Grain 800	GR800	negative	0.60	14	0.18	0
Slide 100	SL100	reversal	0.60	56	0.08	0
Expired 400	PT400	negative	0.58	28	0.14	0.6

γ is the contrast of the straight line as a colour negative. **Grain sites** is how many places in one grain cell a dye cloud can form: fewer sites, coarser grain (the variance is one over the number of sites). **Fog** is the density the film has with no exposure at all. **Expired 400** is Portrait 400 that has sat on a shelf: it carries an age of 0.6 of its own, and the edge print still says PT400. **Slide 100** is a reversal film: it has no masking couplers, so it is never orange, and in C-41 it is cross-processed (see Process).

Push — extra development, from -1 (a one-stop pull) to +3 stops, linear, 0 at a quarter of the travel (the default). Each stop of push raises γ by 15% and adds 0.03 of chemical fog; a pull does the opposite. Push is development only: the under-exposure that usually goes with a push on a shoot is Exposure's job, so for a classic "shot at 1600, pushed two stops", take Exposure down two stops and Push up two.

Age — how long the film sat before it was shot, 0 to 1, linear. It is added to the stock's own age (0.6 for Expired 400) and the total stops at 1. Age does two things. It fogs the film as an **exposure** — radiation and heat in storage — which goes through the curve, so it lifts the shadows and leaves the highlights, and the top, blue-sensitive layer takes the most of it. And it costs speed, the blue layer most. Scanned with the stock's normal profile, the shadows go blue and the highlights warm. Auto Levels takes most of the cast back out, which is true to life: a lab would.

The Process group

Process — the chemistry: **C-41** (the default), **E-6** or **Cross**.

- **C-41** — colour negative chemistry. A negative stock develops into an orange negative, which the scanner inverts. **Slide 100 in C-41 is cross-processing**, identical to choosing Cross.
- **E-6** — reversal chemistry: the film comes out a positive, and the scanner does not invert. Slide 100 in E-6 is a slide as designed, steep and short. A **negative** stock in E-6 is reverse cross-processing: a flat positive that keeps its orange mask.
- **Cross** — the film is treated as reversal film developed in C-41 whatever the stock: a negative, steep (about twice the γ) and short, with **no masking couplers**, because reversal film never had any. The scanner still expects a masked C-41 negative and divides by an orange mask that is not there, so the result goes warm, most in the shadows, the shift shrinking toward the highlights where the mask it expected would have been used up.

Mask On — the masking couplers, on by default. Off, a negative stock has no orange mask, the dyes' impurities are not cancelled, and the manual scanner still divides by the mask it expects: the picture goes dark and red, and colours go muddy. With Auto Levels on, neutrals come back almost neutral — per-channel levels hide a missing mask on greys, which is historically why the mask was needed for printing at fixed filtration and not for a lab that re-measures — but the colours stay muddier. Mask On does nothing for Slide 100 or under Cross, which have no couplers either way.

Under E-6 with a manual scan the picture is a positive, so it is dense where the scene was dark: **Black Point** sets the density that prints *white* and **White Point** the density that prints *black*, and both are scaled for a negative's density range. A slide in E-6 comes out dark and hard at the defaults, and a negative stock in E-6 dark and red. **Turn on Auto Levels for E-6**; it measures the film's own range and suits it better.

The Grain group

Grain acts on how much of each layer developed (its **coverage**, 0 to 1), not on the output colour. Each grain cell of each layer holds a stock's worth of sites, each covered by a dye cloud with a probability equal to that coverage, and the fraction actually covered is what forms dye. A count like that varies most at half coverage and not at all when nothing or everything is covered, so grain is **loudest in the mid-tones and absent in clear shadows and blocked highlights**, with nothing tuned to put it there.

Grain Amount — how much of that fluctuation to keep, 0 to 1, linear. 1 is the full physical figure for the stock's number of sites; 0 is exactly none. The default is 0.35: the full figure at 32 sites is heavier than most operators want.

Grain Size — the size of a grain cell, from 1 to 8 output pixels, geometric: 2 px at a third of the travel, 4 at two thirds. The default is 1.5 px. Grain is counted in **output pixels** from the top-left, not in millimetres of film, so the same setting looks relatively finer at 4K than at 720p. At video-

streaming sizes a 1.5 px cell is easily compressed away; 3 px cells (about 0.53 on the slider) at a high Grain Amount survive.

Grain Seed — 0 to 999, default 1. The same seed, the same film frame and the same pixel always give the same grain. Change it for different grain on a second layer of the same clip.

The Leak group

A light leak is light getting in through the camera back and reaching the film through its base, which the red-sensitive layer, nearest the base, sees first. It is an **exposure**, added to the scene's before the curve, so it saturates on the shoulder rather than adding without limit, and it fogs the whole film at that edge, rebate included — which is when the sprocket holes show up.

Leak Amount — 0 (the default) is no leak at all. Above that, the leak's exposure at its edge, from 4 stops under mid grey at the bottom of the travel to 10 stops over at the top, geometric: mid grey at about 0.29, four stops over at about 0.57. The top of the travel burns to white.

Leak Edge — which edge of the output it comes from: **Left**, **Right** (the default), **Top** or **Bottom**. It is also a little stronger along the middle of that edge than at its ends.

Leak Warmth — the leak's colour, 0 to 1, linear, default 0.8. At 0 it exposes all three layers equally and comes out neutral; at 1 it exposes the red layer fully, the green at 30% and the blue at 6%, which scans as a warm orange.

Leak Spread — how far the leak reaches in: the distance over which it falls off, from 0.05 to 1 frame height, geometric. The default is 0.3 of a frame height, at about 0.6 on the slider. The distance is measured from the edge of the output, whatever the Format.

The Scan group

View — **Positive** (the default) or **Negative**.

- **Positive** — the scan: inverted for a negative, as it came for a slide.
- **Negative** — the film itself on a light box, with nothing inverted and no levels: orange for a C-41 negative, the edge print dark, the sprocket holes clear. Under Cross it is a negative with no orange. Auto Levels, Black Point, White Point and Scanner Gamma do nothing in this view.

Auto Levels — off by default. On, the scanner measures each frame itself, per channel: the least and most dense of 64×36 blocks of the picture area (blocks rather than pixels, so one specular highlight does not set the white), smoothed over about a quarter of a second. It takes its first measurement outright on the first frame and whenever it is switched on, so there is no fade in from black. It removes most of an exposure change, an age cast and a missing mask, as a lab does, and

it is the right setting for E-6 and for footage that needs help. Black Point and White Point do nothing while it is on.

Black Point — for a negative, the density above the film's base (as the scanner's profile expects it) that prints black: 0 to 0.6, linear, default 0.05. Raise it and the shadows crush.

White Point — for a negative, the density above the base that prints white: 0.6 to 3.0, linear, default 1.25. Between the defaults there are about seven stops of scene at Portrait 400's γ . Lower it and the highlights blow sooner; raise it and the whole picture darkens.

Scanner Gamma — the scanner's tone curve, 0.5 to 2, geometric, exactly 1 in the middle (the default). Below 1 the picture gets lighter and flatter; above 1, darker and more contrasty in the mid-tones.

For a manual scan of a negative, the scanner's profile is always the stock's **fresh, normally developed, masked C-41** profile, whatever the film really is. That is what makes an expired roll go blue and a cross-process go warm, and it is what a lab does when it runs a roll as C-41. Under E-6 the profile is an unmasked slide's.

The Frame group

Format — **Full**, **6×6** or **35 mm** (the default).

- **Full** — no film round the picture: the scan fills the output.
- **6×6** — 120 roll film, 61.5 mm wide, a square 56 mm frame, no perforations. The stock code is printed in the top margin; there are no frame numbers, because 120 carries them on its backing paper, not the film.
- **35 mm** — a 36×24 mm frame on a 35 mm strip, the common negative perforation, the stock code above the frame and frame numbers below it.

The strip runs across the output and the film's full width fills its height, the way a strip scanner sees it. The clip is centre-cropped to the frame's shape (3:2, or square), and everything outside the frame is unexposed film. In the positive, unexposed film prints black and the holes print black too; the edge print, exposed at the factory, prints light. In the negative the holes are clear.

Edge Text On — the edge print, on by default. It is a latent image, exposed well up the curve, so it prints light in the positive and dark on the negative. The codes are the stock's (see the Stock table) and the numbers are invented; no real manufacturer's name or mark appears.

Frame Number — the number printed under the frame, 0 to 99, default 12. The 35 mm strip prints **>12** under the frame's centre and **11A** and **12A** at the half frames either side; numbers wrap past 99. It does nothing in 6×6 or Full.

Mix — the scan against the untouched clip, 0 to 1, default 1. At 1 the output is exactly the scan and fully opaque: film is opaque, and the black rebate is part of the picture, not transparency. Below 1

the output, alpha included, is mixed towards the clip's.

How it works

Once a frame, in up to five passes:

1. **Copy.** The clip into a float texture of the effect's own.
2. **The film.** For every output pixel: where it falls on the film (the frame, the rebate, a hole, the edge print), the scene there reduced into the frame, the layers' exposures — scene, age fog, edge print and leak — and the curve, to how much of each layer developed.
3. **Blocks** and 4. **levels**, only with Auto Levels on in the Positive view: mean channel densities of up to 64×36 blocks of the picture, then the least and most dense, smoothed.
4. **The scan.** Grain on the coverage, dye, the mask, transmittance through the film and the holes, then the scanner, then Mix, straight to the output.

The numbers that describe the film — curve, base, dye impurities, layer overlap, ageing, the five stocks — live in one file, and the shaders are assembled from one library of the model's arithmetic, so the effect and the harness that measures it agree on what a stock is.

Performance

Measured by the offline harness on an M4 Max at the default controls, best of three runs of 60 frames after a warm-up, on a GPU shared with other work:

	ms/frame	% of a 60 fps frame
1280×720	0.20	1.2%
1920×1080	0.33	2.0%
2560×1440	0.54	3.2%
3840×2160	1.19	7.2%

Auto Levels adds its block reduction: about 0.6 ms more at 4K. The grain loops over the stock's grain sites, so Fine 100 (64) does the most work of the five; that was not timed separately. If the effect cannot allocate its buffers it does nothing and says so in the log.

Nothing was timed inside Resolume, and nothing was timed on Windows.

If it looks wrong

Nothing seems to happen. Check Mix. At the defaults the 35 mm strip is plainly there on any clip, so if even that is missing, see *The effect does nothing at all* below.

The picture is small, in a black frame. That is the 35 mm Format. Set **Format** → **Full** for the whole frame.

There are no sprocket holes. In the positive they print black on a black rebate. They show in **View** → **Negative**, or where a leak lights the film round them. 6×6 has none.

Exposure, Age or Cross do almost nothing. Auto Levels is on and is taking them back out, as a lab would. Turn it off.

E-6 is dark, or dark and red. The manual scan's points are scaled for a negative. Turn on Auto Levels.

Everything is dark and red. Mask On is off, or the Process is E-6 with a negative stock.

I can't see the grain. At 1.5 px cells and 0.35 it is fine, and video compression removes fine grain first. Raise Grain Size and Grain Amount, or choose Grain 800.

The grain looks the same on two layers. Same seed, same clip time: give one a different Grain Seed.

The effect does nothing at all. A shader that will not compile looks exactly like that, and so does a buffer too large to allocate. The real message is in the log:

```
macOS    ~/Library/Logs/rebate/rebate.YYYY-MM-DD.log
Windows  %LOCALAPPDATA%\rebate\logs\rebate.YYYY-MM-DD.log
```

It records the GL vendor and version at load, which shader failed if one did, and the buffer size if it could not be allocated.

Known limits

- **Not loaded into Resolume on macOS yet**, and nothing has driven the controls in a show. On Windows it loads and renders in Arena, on software rendering, with every control as declared. How 22 controls in six groups read in the inspector on a Mac and what a long session's clock does to the grain are untested.
- **The stocks are invented**, described by their parameters (γ , grain sites, fog, age), not measured from any real film. The constants were chosen by reasoning and by eye on a test card.
- **Three numbers per dye**, not spectral dye curves; no interlayer effects, no adjacency (edge) effects, no halation, no gate weave, no dust. A real scanner's colour matrix and tone curve are one levels step and one gamma here.

- **Grain is per output pixel**, not per micron of film, so it does not scale with the frame.
 - **The scene is reduced into the film frame** by a four-tap filter, good for the reduction the formats need (at most about 1.6×).
 - **The rest of the strip is unexposed**: no neighbouring frames either side.
 - **The host clock handling has only met the harness's clock**. It is the same approach as the fleet's readout effect, which has met Arena. This effect has too, on Windows, but nothing there checked its clock.
 - **Not verified at 4K**, only timed there.
 - **No presets** and no OpenFX version. The Stock menu is the nearest thing to a preset list.
-

About

The last group, **About**, carries the plugin's name, version, licence and maker, and buttons that open this guide, the project page, the source on GitHub and the support page in your browser.

Reporting something

github.com/stoatworks-labs/rebate/issues. A screenshot, the Stock, Process, View and Auto Levels settings, and the composition's resolution are usually enough.

Rebate · guide updated 2026-09-24 · stoatworks-labs.com/software/rebate/

Latest version of this guide: stoatworks-labs.com/software/rebate/guide/ · Source and issues:

<https://github.com/stoatworks-labs/rebate>